



Weight-Loss Surgery for Adults With Diabetes or Prediabetes Who Are at the Lower Levels of Obesity

A Review of the Research for Adults With a BMI Between 30 and 35



Is This Information Right for Me?

If you meet all the following, this summary is for you:

- You are at the lower levels of obesity, with a body mass index (BMI) between 30 and 35.* BMI is a measurement based on height and weight that doctors use to identify people whose weight may cause serious health problems.
- Your doctor† has told you that you have diabetes or prediabetes (your blood sugar level is higher than normal, but not as high as with diabetes).
- You want to know what research says about weight-loss surgery, also called “bariatric” (pronounced bare-ee-AH-trick) surgery, to treat your diabetes or prediabetes.

What will this summary cover?

This summary will cover:

- Diabetes and prediabetes and how they are treated
- BMI and how it is measured
- How the digestive system works
- What weight-loss surgery is and an overview of three types of weight-loss surgery: adjustable gastric band, sleeve gastrectomy, and gastric bypass
- Risks for each type of weight-loss surgery
- What researchers have found about how well weight-loss surgery works to treat diabetes or prediabetes in people with a BMI between 30 and 35

This summary can help you talk with your doctor about whether weight-loss surgery might be right for you.

Note: This summary does not discuss how to prepare for weight-loss surgery or what you should expect after surgery. Talk with your doctor for more information about what to do before and after weight-loss surgery.

* If you are unsure of your BMI, please see the chart on page 3.

† In this summary, the term doctor refers to your health care professional, including your physician, gastroenterologist (a specialist who treats the digestive system), bariatric surgeon, nurse practitioner, or physician assistant.

Where does the information come from?

Researchers funded by the Agency for Healthcare Research and Quality (AHRQ), a Federal Government research agency, reviewed 54 studies published through September 2012 on weight-loss surgery for people with diabetes or prediabetes and a BMI between 30 and 35. The report was reviewed by clinicians, researchers, experts, and the public. You can read the report at www.effectivehealthcare.ahrq.gov/weight-loss-surgery.cfm.

Note: Doctors often suggest weight-loss surgery for people at higher levels of obesity. The research for this summary is on weight-loss surgery for people with diabetes or prediabetes who have a BMI between 30 and 35.

There are other weight-loss surgeries than those listed in this summary. The surgeries discussed here are the ones studied in the research for this summary.



Understanding Your Condition

What are diabetes and prediabetes?

Diabetes (also called “diabetes mellitus,” pronounced DI-ah-BEE-teez MEL-eh-tuhs) is a condition in which your body has trouble managing the level of sugar (or glucose) in your blood. This causes your blood sugar to be too high. In prediabetes, your blood sugar level is higher than normal but is not yet high enough to be called diabetes. People with prediabetes have a high risk of developing diabetes.

High blood sugar can cause serious health problems, including:

- Hardening of the arteries
- Heart disease
- Stroke
- Kidney disease
- Blindness
- Increased infections
- Loss of toes, feet, legs, or fingers caused by poor circulation and infections

If not treated, high blood sugar can even lead to death.

How common are diabetes and prediabetes?

- About 8 out of every 100 people in the United States have diabetes.
- About 33 out of every 100 people age 20 or older in the United States have prediabetes.

What is body mass index?

Body mass index (BMI) is a measurement based on your height and weight (find your BMI using the chart on the next page). BMI is one of many ways doctors identify people whose weight may cause serious health problems.

People with a BMI of 30 or higher are considered obese and have an increased risk for health problems. Almost half of adults who have diabetes have a BMI of 30 or higher. This summary is for people with a BMI between 30 and 35 who have diabetes or prediabetes.

Finding your BMI

The chart below can help you find your BMI. First, find your height along the left side of the chart. Then, follow that line across until you find the number closest to your weight. Follow that column up to the top of the chart to find your BMI.

Examples:

- 1 If you are 5 feet, 5 inches tall and weigh 180 pounds, your BMI would be 30 .
- 2 If you are 6 feet, 0 inches tall and weigh 235 pounds, your BMI would be 32 .

Height	Normal BMI				Overweight BMI					Obese BMI									
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
4 feet, 10 inches	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167	172	177	181	186
4 feet, 11 inches	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173	178	183	188	193
5 feet, 0 inches	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179	184	189	194	199
5 feet, 1 inch	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185	190	195	201	206
5 feet, 2 inches	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191	196	202	207	213
5 feet, 3 inches	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197	203	208	214	220
5 feet, 4 inches	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204	209	215	221	227
1 5 feet, 5 inches	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	216	222	228	234
5 feet, 6 inches	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216	223	229	235	241
5 feet, 7 inches	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223	230	236	242	249
5 feet, 8 inches	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230	236	243	249	256
5 feet, 9 inches	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236	243	250	257	263
5 feet, 10 inches	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243	250	257	264	271
5 feet, 11 inches	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250	257	265	272	279
2 6 feet, 0 inches	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258	265	272	279	287
6 feet, 1 inch	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265	272	280	288	295
6 feet, 2 inches	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272	280	287	295	303
6 feet, 3 inches	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279	287	295	303	311
6 feet, 4 inches	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287	295	304	312	320

Understanding Your Options

How are diabetes and prediabetes treated?

Your doctor may suggest several things to help control your diabetes or keep your prediabetes from getting worse. These include:

- A healthy diet
- Exercise
- Achieving a healthy weight
- Monitoring your blood sugar
- Medicine

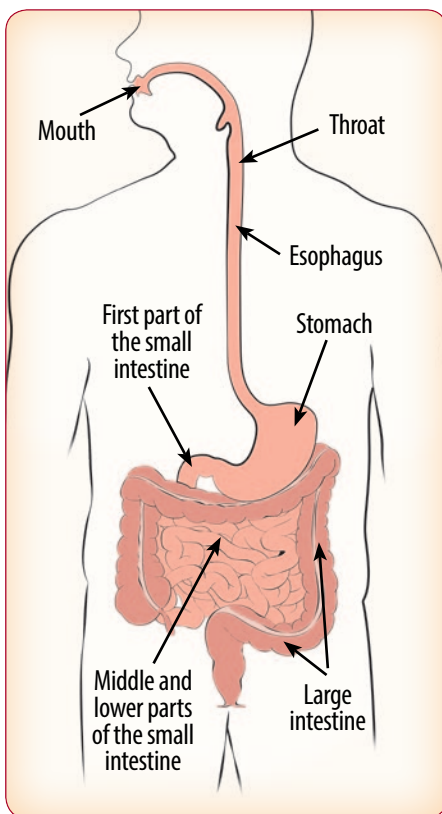
If you try these methods and are not able to achieve a healthy weight and control your diabetes or keep your prediabetes from getting worse, your doctor may suggest weight-loss surgery (called “bariatric” surgery). You should not consider weight-loss surgery unless you have tried the methods listed above and they did not work.

This summary discusses what researchers have found about weight-loss surgery to treat diabetes or prediabetes in people with a BMI between 30 and 35. Pages 6 through 8 discuss what weight-loss surgery is and give an overview of three types of weight-loss surgery.



How does the digestive system work?

When you swallow food, it moves down your throat, through a narrow tube (called the esophagus), and into your stomach. In the stomach, digestive juices start breaking down the food. From the stomach, the food moves to the first part of your small intestine. Here, more digestive juices speed up digestion, and some of the calories and nutrients are absorbed. The food then moves through the middle and lower parts of your small intestine, where the rest of the calories and nutrients are absorbed. Any food that cannot be digested moves from the small intestine into your large intestine (also called the colon), where it stays as waste until it leaves your body.



What are calories?

Calories are listed in the nutrition information of the foods you eat and tell you how much energy is in one serving of food. You burn calories when you use energy to exercise and do other activities. If you do not use all of the calories that you eat, the extra energy is changed into fat and stored in your body.

What is weight-loss surgery?

Weight-loss surgery is surgery on your stomach (and sometimes intestine) to help you lose weight. Weight-loss surgery is **not** surgery to remove fat.

Weight-loss surgery can work by:

- Limiting the amount of food you can eat at one time
- Changing the way your food is digested so fewer calories and nutrients are absorbed
- Causing hormone changes that lessen your appetite

In addition to helping people lose weight, weight-loss surgery can help control diabetes and keep prediabetes from getting worse.

Doctors may suggest weight-loss surgery to people with a BMI above 40. Doctors may also suggest weight-loss surgery to people with a BMI of 35 or higher who have a serious health problem because of their weight (such as diabetes, sleep apnea, or high blood pressure). However, weight-loss surgery may also help people at lower levels of obesity (a BMI between 30 and 35) who have diabetes or prediabetes.

Three common types of weight-loss surgery are:

- Adjustable gastric band (Lap-Band Gastric Banding System®, Realize Gastric Band®)
- Sleeve gastrectomy
- Gastric bypass

Note: Weight-loss surgery is not a quick and easy answer to losing weight and controlling your diabetes or keeping your prediabetes from getting worse. People who have weight-loss surgery must change the way they eat and must get regular exercise. Weight-loss surgery also comes with many risks, which are listed on page 9.

Overview of Weight-Loss Surgeries

Adjustable Gastric Band

How does it work?

An adjustable gastric band decreases the amount of food you can eat at one time. The band makes you feel full after eating only a small amount.

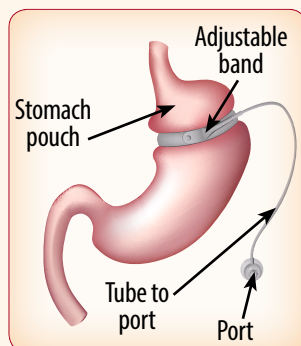
After having this surgery, eating too much at one time may cause you to vomit.

How is it done?

The surgeon puts a small band around the top of your stomach. The band squeezes your stomach to make a small pouch. The band is adjustable, and your doctor can make it smaller or wider, depending on how full you feel after eating, how hungry you are, and how much weight you are losing. The band is filled with saltwater and is connected to a tube that leads to a port. The port is placed inside your body just under the skin. Your doctor can change the size of the band by sticking a needle through the skin into the port and adding or removing saltwater.

Is it reversible?

It is possible to reverse this type of weight-loss surgery. A surgeon can take the band out, but it may be difficult due to scarring from the first surgery.



Sleeve Gastrectomy

How does it work?

A sleeve gastrectomy works in two ways:

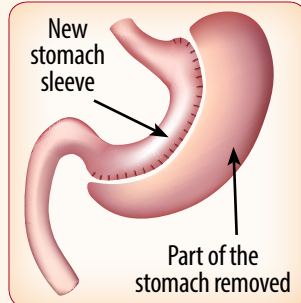
- By decreasing the amount of food you can eat at one time
- By causing hormone changes that lessen your appetite

How is it done?

The surgeon removes most of your stomach, leaving only a narrow tube (or “sleeve”) for food to travel through.

Is it reversible?

This type of weight-loss surgery is not reversible.



Gastric Bypass

How does it work?

A gastric bypass works in three ways:

- By decreasing the amount of food you can eat at one time
- By changing the way calories and nutrients are absorbed from the food you eat
- By causing hormone changes that lessen your appetite

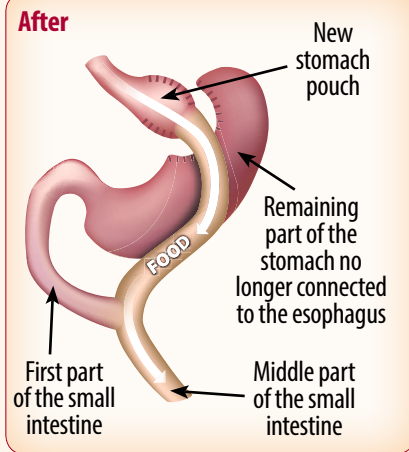
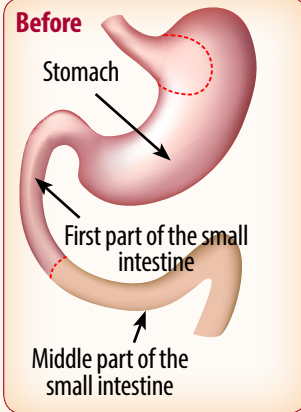
After having this surgery, eating a lot of carbohydrates (starches), sugar, or fat could cause pain in your belly, cramping, nausea, and diarrhea.

How is it done?

The surgeon divides your stomach to make a small pouch. The surgeon then connects the end of the pouch to the middle part of your small intestine. This means that when you eat, the food does not go through the rest of your stomach and the first part of your small intestine.

Is it reversible?

This type of weight-loss surgery is not reversible.



Laparoscopic Surgery

These three types of weight-loss surgery (adjustable gastric band, sleeve gastrectomy, and gastric bypass) can be done as laparoscopic surgery (pronounced lah-puh-ruh-SKAHP-ik). In laparoscopic surgery, the surgeon uses a tool called a laparoscope (pronounced LAH-pruh-skohp). A laparoscope is a thin tube with a tiny camera that the surgeon puts through small cuts in your belly along with other small tools to do the surgery. The laparoscope lets the surgeon see inside your body and do the surgery without having to make a big cut. This may help you recover more quickly.

What are the risks of weight-loss surgery?

Weight-loss surgery comes with many risks. Some of these risks can be life threatening.

All weight-loss surgeries come with these risks:

- Stomach pain, nausea, and vomiting
- Stomach ulcers
- Injury to your organs (such as the intestines or stomach)
- Infection in the surgery wound
- Bleeding in your belly
- Blood clots (a clot could travel to your lung, which could be life threatening*)

Note: In some cases, people may not lose weight after weight-loss surgery. It is also possible to gain back weight that was lost.

* This is a risk with any surgery.

Other possible risks are listed below for each type of weight-loss surgery.

Adjustable gastric band comes with these risks:

- The band could slip out of place*
- The band could become embedded in your stomach*
- Problems with the tube that connects the band to the port
- Problems with the port

* If this happens, you may need another surgery to fix the band or remove it.

Sleeve gastrectomy comes with these risks:

- Worsened acid reflux (heartburn)
- Blockages in your stomach from scar tissue*
- Leaks from where your stomach was cut*
- Narrowing of the sleeve created during surgery (symptoms of this include nausea, vomiting, and difficulty swallowing)[†]

* You may need another surgery to fix this.

[†] If this happens, the doctor may need to do a procedure to widen the sleeve.

Gastric bypass comes with these risks:

- Not getting enough vitamins and other nutrients your body needs
- Blockages in your intestines from scar tissue*
- Internal hernia (part of your intestine bulges through an opening inside your belly)*
- Leaks from your intestines where cuts were made during the surgery*
- Narrowing of the connection between your stomach and intestine (symptoms of this include nausea, vomiting, and difficulty swallowing)[†]

* You may need another surgery to fix this.

[†] If this happens, the doctor may need to do a procedure to widen the connection.

What have researchers found about weight-loss surgery for people with diabetes or prediabetes and a BMI between 30 and 35?

Researchers found that for people with diabetes or prediabetes and a BMI between 30 and 35:

- All three types of weight-loss surgery:
 - Helped with weight loss (in studies that lasted up to 2 years)
 - Helped control diabetes and keep prediabetes from getting worse (in studies that lasted up to 2 years)
 - Appeared to lower weight and control blood sugar more than medicine, diet, and exercise (in studies that lasted 1 year)
- Weight-loss surgery starts helping to lower blood sugar in some people as early as 1 month after surgery.

Note: After weight-loss surgery, it is possible to gain back weight that was lost. It is also possible for your diabetes or prediabetes to get worse again. After surgery, you may need to start taking weight-loss medicines and diabetes medicines again.



What have researchers found about how much weight-loss surgery, diet and exercise, and medicine lower weight and blood sugar?

The chart below shows what researchers found about how much weight-loss surgery, diet and exercise, and diabetes medicines lower weight and blood sugar after 1 year.

To check your blood sugar level, your doctor may do an HbA1c (hemoglobin A1c) blood test. This blood test shows your average blood sugar level over the past 2 to 3 months. Usually, the goal is for your HbA1c to be less than 7. This means that your blood sugar level has been in the “good” range over the past 2 to 3 months. If your HbA1c is higher than 7, your blood sugar is too high. Weight-loss surgery, diet and exercise, and diabetes medicines all help lower your HbA1c.

	Weight After 1 Year	HbA1c (Average Blood Sugar Level) After 1 Year
People who had weight-loss surgery:	Lost about 30 to 45 pounds*	Lowered their level by about 2.5 to 3.5
People who used diet and exercise and did not have surgery:	Lost about 6 pounds	Lowered their level by about 0.5 to 2
People who took diabetes medicines and did not have surgery:	Lost up to 6 pounds or gained up to 5 pounds, depending on the medicine	Lowered their level by about 0.5 to 1
* More research is needed to know this for sure.		

Note: Weight loss and the amount that HbA1c is lowered may be different, depending on the specific type of weight-loss surgery. There is not enough research to know how the specific types of weight-loss surgery compare to each other.

There is also not enough research that directly compares weight-loss surgery to diet and exercise or diabetes medicines to know how these treatment options compare to each other.

Note: It is important to remember that people who have weight-loss surgery must change the way they eat and must get regular exercise.

What are the costs of weight-loss surgery?

Weight-loss surgery can cost between \$20,000 and \$25,000. The costs to you depend on your health insurance plan and which surgery you have. Your health insurance plan may not cover all weight-loss surgeries. Check with your health insurance provider to see if weight-loss surgery is covered for you.

Making a Decision

What should I think about?

There are several things to think about when deciding if weight-loss surgery to treat your diabetes or prediabetes is right for you. You and your doctor may want to talk about:

- The trade-offs between the possible benefits and risks of weight-loss surgery
- The lifestyle changes you will need to make if you have weight-loss surgery
- If you decide to have weight-loss surgery, which surgery is best for you
- How you feel about weight-loss surgeries that are difficult to reverse or are not reversible
- How long you would be away from work and other daily activities after surgery
- The costs of weight-loss surgery and whether your health insurance covers it
 - You may want to think about how the costs of weight-loss surgery compare to the costs of weight-loss medicines and medicines to treat diabetes or prediabetes.

Ask Your Doctor or Surgeon

- Could weight-loss surgery help me control my diabetes or keep my prediabetes from getting worse?
- If I do not have weight-loss surgery, how will we control my diabetes or keep my prediabetes from getting worse?
- If weight-loss surgery could help, which surgery do you think may be best for me?
- If I have surgery, how long will I be in the hospital? How long will I be away from work and daily activities?
- What serious side effects should I look for?
- After the surgery, what lifestyle changes will I need to make? Will I need to follow a certain diet? What portion size will I need to eat? How much exercise will I need?
- How long after the surgery will it take for my diabetes or prediabetes to get better?
- Will I still need my diabetes medicines?

Other questions:

Write the answers here:

Sources

The information in this summary comes from the report *Bariatric Surgery and Nonsurgical Therapy in Adults With Metabolic Conditions and a Body Mass Index of 30.0 to 34.9 kg/m²*, June 2013. The report was produced by the Southern California Evidence-based Practice Center through funding by the Agency for Healthcare Research and Quality (AHRQ).

For a copy of the report, or for more information about AHRQ and the Effective Health Care Program, go to www.effectivehealthcare.ahrq.gov/weight-loss-surgery.cfm.

Additional information came from the MedlinePlus® Web site, a service of the National Library of Medicine and the National Institutes of Health. This site is available at www.nlm.nih.gov/medlineplus.

This summary was prepared by the John M. Eisenberg Center for Clinical Decisions and Communications Science at Baylor College of Medicine, Houston, TX. People with diabetes or prediabetes and a BMI between 30 and 35 and people who have had weight-loss surgery reviewed this summary.

